

SEQUENCE LISTING

- <110> Walker, David H.
Yu, Xu-Jie
- <120> *Ehrlichia chaffeensis* 28 kDa Outer Membrane
Protein Multigene Family
- <130> D6311
- <141> 2001-05-01
- <150> 60/201,035
<151> 2000-05-01
- <160> 53
- <210> 1
<211> 284
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- <220>
<223> P28-1 Outer Membrane Protein of
Ehrlichia chaffeensis
- <400> 1

Met	Ser	Lys	Arg	Ser	Asn	Arg	Lys	Phe	Val	Leu	Trp	Val	Met	Leu
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Ile	Leu	Phe	Thr	Pro	His	Ile	Ser	Leu	Ala	Ser	Val	Leu	Asn	Asp
				20					25					30

His	Asn	Ser	Met	Tyr	Val	Gly	Ile	Gln	Tyr	Lys	Pro	Ala	Arg	Gln	
				35					40					45	
His	Leu	Ser	Lys	Leu	Leu	Ile	Lys	Glu	Ser	Ala	Ala	Asn	Thr	Val	
				50					55					60	
Glu	Val	Phe	Gly	Leu	Lys	Lys	Asp	Leu	Leu	Asn	Asp	Leu	Leu	Thr	
				65					70					75	
Gly	Ile	Lys	Asp	Asn	Thr	Asn	Phe	Asn	Ile	Lys	Tyr	Asn	Pro	Tyr	
				80					85					90	
Tyr	Glu	Asn	Asn	Arg	Leu	Gly	Phe	Ser	Gly	Ile	Phe	Gly	Tyr	Tyr	
				95					100					105	
Tyr	Asn	Lys	Asn	Phe	Arg	Ile	Glu	Ser	Glu	Leu	Ser	Tyr	Glu	Thr	
				110					115					120	
Phe	His	Ile	Lys	Asn	Asn	Gly	Tyr	Lys	Arg	Ile	Asp	Cys	Glu	Lys	
				125					130					135	
His	Phe	Ala	Leu	Ala	Lys	Glu	Ile	Ser	Gly	Gly	Ser	Asn	Asn	Pro	
				140					145					150	
Ala	Asn	Asn	Lys	Tyr	Val	Thr	Leu	Ile	Asn	Asn	Gly	Ile	Ser	Leu	
				155					160					165	
Thr	Ser	Ala	Leu	Ile	Asn	Val	Cys	Tyr	Asp	Val	Asp	Gly	Leu	Lys	
				170					175					180	
His	Asn	Ile	Ile	Thr	Tyr	Ser	Cys	Leu	Gly	Phe	Gly	Val	Asp	Thr	
				185					190					195	
Ile	Asp	Phe	Leu	Ser	Lys	Tyr	Thr	Thr	Lys	Phe	Ser	Tyr	Gln	Gly	
				200					205					210	
Lys	Leu	Gly	Ala	Ser	Tyr	Thr	Val	Ser	Pro	Gln	Val	Ser	Val	Phe	
				215					220					225	
Ile	Glu	Gly	Tyr	Tyr	His	Gly	Leu	Phe	Gly	Lys	Lys	Phe	Glu	Lys	
				230					235					240	
Ile	Pro	Val	Asn	Tyr	Pro	Cys	Asp	Tyr	Pro	Ser	Pro	Thr	Pro	Pro	
				245					250					255	

Asn Ser Lys Pro His Val His Thr Thr Ala Leu Ala Met Leu Ser
 260 265 270

Ile Gly Tyr Tyr Gly Gly Ser Ile Gly Ile Lys Phe Ile Leu
 275 280

<210> 2

<211> 297

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-2 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 2

Met Ser Tyr Ala Lys Val Phe Ile Leu Ile Cys Leu Ile Leu Leu
 5 10 15

Val Pro Ser Leu Ser Phe Ala Ile Val Asn Asn Asp Phe Leu Lys
 20 25 30

Asp Asn Ile Gly His Phe Tyr Ile Gly Gly Gln Tyr Lys Pro Gly
 35 40 45

Val Pro Arg Phe Asn Arg Phe Leu Val Thr Asn Asn Asn Ile Arg
 50 55 60

Glu Leu Met Ser Ser Asp Glu Glu Cys Arg Ser Thr Ile Pro His
 65 70 75

Met Val Gln Ser Val Ala Gln Gly Thr Leu Pro Pro Glu Ala Leu
 80 85 90

Glu Glu Leu Ala Asp Gly Lys Phe Pro Glu Gly Tyr Leu Tyr Phe
 95 100 105

Thr	Ile	Pro	Tyr	Asn	Pro	Thr	Tyr	Lys	Lys	Asn	Leu	Leu	Gly	Ala	
				110					115					120	
Gly	Gly	Val	Ile	Gly	Tyr	Ser	Thr	Thr	His	Phe	Arg	Val	Glu	Val	
				125					130					135	
Glu	Ala	Phe	Tyr	Asp	Lys	Phe	Asn	Leu	Thr	Ala	Pro	Ala	Gly	Tyr	
				140					145					150	
Leu	His	Lys	Asn	Phe	Tyr	Glu	Tyr	Phe	Ala	Leu	Ala	Thr	Thr	Met	
				155					160					165	
Asp	Thr	Lys	His	Pro	His	Gln	Ser	Ala	Glu	Asp	Lys	Tyr	Tyr	Tyr	
				170					175					180	
Met	Lys	Asn	Thr	Gly	Ile	Thr	Leu	Ser	Pro	Phe	Ile	Ile	Asn	Ala	
				185					190					195	
Cys	Tyr	Asp	Phe	Ile	Leu	Lys	Lys	Thr	Arg	Asn	Val	Ala	Pro	Tyr	
				200					205					210	
Leu	Cys	Leu	Gly	Val	Gly	Gly	Asn	Phe	Ile	Asp	Phe	Leu	Asp	Gln	
				215					220					225	
Val	Ser	Phe	Lys	Phe	Ala	Tyr	Gln	Ala	Lys	Val	Gly	Ile	Ser	Tyr	
				230					235					240	
Phe	Val	Ser	Pro	Asn	Ile	Ala	Phe	Phe	Ile	Asp	Gly	Ser	Phe	His	
				245					250					255	
Gly	His	Leu	Asn	Asn	Gln	Phe	Ser	Asp	Ser	Pro	Val	Val	Asp	Tyr	
				260					265					270	
Ser	Ser	Ser	Gly	Phe	Pro	Thr	Ile	Ser	Ala	Lys	Phe	Asn	Ala	Asn	
				275					280					285	
Phe	Leu	Thr	Ser	Ser	Ile	Gly	Ile	Arg	Phe	Ile	Ser				
				290					295						

<210> 3

<211> 285

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-3 Outer Membrane Protein of
 Ehrlichia chaffeensis

<400> 3

Met	Gln	Lys	Leu	Tyr	Ile	Ser	Phe	Ile	Ile	Leu	Ser	Gly	Leu	Leu	
				5					10					15	
Leu	Pro	Lys	Tyr	Val	Phe	Cys	Met	His	Gln	Asn	Asn	Asn	Ile	Asp	
				20					25					30	
Gly	Ser	Tyr	Val	Thr	Ile	Lys	Tyr	Gln	Leu	Thr	Thr	Pro	His	Phe	
				35					40					45	
Lys	Asn	Phe	Tyr	Ile	Lys	Glu	Thr	Asp	Phe	Asp	Thr	Gln	Glu	Pro	
				50					55					60	
Ile	Gly	Leu	Ala	Lys	Ile	Thr	Ala	Asn	Thr	Lys	Phe	Asp	Thr	Leu	
				65					70					75	
Lys	Glu	Asn	Phe	Ser	Phe	Ser	Pro	Leu	His	Gln	Thr	Asp	Ser	Tyr	
				80					85					90	
Lys	Ser	Tyr	Gln	Asn	Asp	Leu	Leu	Gly	Ile	Gly	Leu	Ser	Val	Gly	
				95					100					105	
Leu	Phe	Val	Lys	Ser	Phe	Arg	Ile	Glu	Phe	Glu	Gly	Ala	Tyr	Lys	
				110					115					120	
Asn	Phe	Asn	Thr	Lys	Arg	Leu	Ala	Arg	Tyr	Lys	Ser	Lys	Asp	Gly	
				125					130					135	
Tyr	Lys	Tyr	Phe	Ala	Ile	Pro	Arg	Lys	Ser	Glu	His	Gly	Phe	Leu	
				140					145					150	
Asp	Asn	Thr	Phe	Gly	Tyr	Thr	Val	Ala	Lys	Asn	Asn	Gly	Ile	Ser	
				155					160					165	
Ile	Ile	Ser	Asn	Ile	Ile	Asn	Leu	Cys	Ser	Glu	Thr	Lys	Tyr	Lys	
				170					175					180	

Ser	Phe	Thr	Pro	Tyr	Ile	Cys	Ile	Gly	Val	Gly	Gly	Asp	Phe	Ile
				185					190					195
Glu	Ile	Phe	Asp	Val	Met	Arg	Ile	Lys	Phe	Ala	Tyr	Gln	Gly	Lys
				200					205					210
Val	Gly	Val	Ser	Tyr	Pro	Ile	Thr	Ser	Lys	Leu	Ile	Leu	Ser	Ile
				215					220					225
Asn	Gly	Gln	Tyr	His	Lys	Val	Ile	Gly	Asn	Lys	Phe	Glu	Leu	Leu
				230					235					240
Pro	Val	Tyr	Gln	Pro	Val	Glu	Leu	Lys	Arg	Leu	Val	Thr	Asn	Lys
				245					250					255
Thr	Ser	Lys	Asp	Ile	Asp	Gln	Asp	Val	Thr	Ala	Ser	Leu	Thr	Leu
				260					265					270
Asn	Leu	Glu	His	Phe	Ser	Ser	Glu	Ile	Gly	Leu	Ser	Phe	Ile	Phe
				275					280					285

<210> 4

<211> 272

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-4 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 4

Met	Tyr	Met	Tyr	Asn	Lys	Lys	His	Tyr	Cys	Tyr	Ile	Val	Thr	Tyr
				5					10					15
Val	Ile	Thr	Leu	Phe	Phe	Leu	Leu	Leu	Pro	Ile	Glu	Ser	Leu	Ser
				20					25					30
Ala	Leu	Ile	Gly	Asn	Val	Glu	Lys	Asp	Leu	Lys	Val	Ser	Ser	Thr
				35					40					45

Tyr	Val	Ser	Ser	Gln	Tyr	Lys	Pro	Ser	Ile	Phe	His	Phe	Arg	Asn
				50					55					60
Phe	Ser	Ile	Gln	Glu	Ser	His	Pro	Lys	Lys	Ser	Ser	Glu	Glu	Phe
				65					70					75
Lys	Lys	Ile	Lys	Ala	Asn	Leu	Asn	Asn	Ile	Leu	Lys	Ser	Asn	Ala
				80					85					90
Tyr	Asn	Leu	Gln	Phe	Gln	Asp	Asn	Thr	Thr	Ser	Phe	Ser	Gly	Thr
				95					100					105
Ile	Gly	Tyr	Phe	Ser	Lys	Gly	Leu	Arg	Leu	Glu	Ala	Glu	Gly	Cys
				110					115					120
Tyr	Gln	Glu	Phe	Asn	Val	Lys	Asn	Ser	Asn	Asn	Ser	Leu	Ile	Ile
				125					130					135
Ser	Ser	Asn	Lys	Tyr	His	Ser	Arg	Ile	His	Asp	Glu	Asn	Tyr	Ala
				140					145					150
Ile	Thr	Thr	Asn	Asn	Lys	Leu	Ser	Ile	Ala	Ser	Ile	Met	Val	Asn
				155					160					165
Thr	Cys	Tyr	Asp	Ile	Ser	Ile	Asn	Asn	Thr	Ser	Ile	Val	Pro	Tyr
				170					175					180
Leu	Cys	Thr	Gly	Ile	Gly	Glu	Asp	Leu	Val	Gly	Leu	Phe	Asn	Thr
				185					190					195
Ile	His	Phe	Lys	Leu	Ala	Tyr	Gln	Gly	Lys	Val	Gly	Met	Ser	Tyr
				200					205					210
Leu	Ile	Asn	Asn	Asn	Ile	Leu	Leu	Phe	Ser	Asp	Ile	Tyr	Tyr	His
				215					220					225
Lys	Val	Met	Gly	Asn	Arg	Phe	Lys	Asn	Leu	Tyr	Met	Gln	Tyr	Val
				230					235					240
Ala	Asp	Pro	Asn	Ile	Ser	Glu	Glu	Thr	Ile	Pro	Ile	Leu	Ala	Lys
				245					250					255
Leu	Asp	Ile	Gly	Tyr	Phe	Gly	Ser	Glu	Ile	Gly	Ile	Arg	Phe	Met
				260					265					270

Phe Asn

<210> 5
<211> 295
<212> PRT
<213> *Ehrlichia chaffeensis*

<220>
<223> P28-5 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 5

Met	Thr	Lys	Lys	Phe	Asn	Phe	Val	Asn	Val	Ile	Leu	Thr	Phe	Leu	
				5					10					15	
Leu	Phe	Leu	Phe	Pro	Leu	Lys	Ser	Phe	Thr	Thr	Tyr	Ala	Asn	Asn	
				20					25					30	
Asn	Thr	Ile	Thr	Gln	Lys	Val	Gly	Leu	Tyr	Ile	Ser	Gly	Gln	Tyr	
				35					40					45	
Lys	Pro	Ser	Ile	Pro	His	Phe	Lys	Asn	Phe	Ser	Val	Glu	Glu	Asn	
				50					55					60	
Asp	Lys	Val	Val	Asp	Leu	Ile	Gly	Leu	Thr	Thr	Asp	Val	Thr	Tyr	
				65					70					75	
Ile	Thr	Glu	His	Ile	Leu	Arg	Asp	Asn	Thr	Lys	Phe	Asn	Thr	His	
				80					85					90	
Tyr	Ile	Ala	Lys	Phe	Lys	Asn	Asn	Phe	Ile	Asn	Phe	Ser	Ser	Ala	
				95					100					105	
Ile	Gly	Tyr	Tyr	Ser	Gly	Gln	Gly	Pro	Arg	Leu	Glu	Ile	Glu	Ser	
				110					115					120	
Ser	Tyr	Gly	Asp	Phe	Asp	Val	Val	Asn	Tyr	Lys	Asn	Tyr	Ala	Val	
				125					130					135	

Gln	Asp	Val	Asn	Arg	Tyr	Phe	Ala	Leu	Val	Arg	Glu	Lys	Asn	Gly	140	145	150
Ser	Asn	Phe	Ser	Pro	Lys	Pro	His	Glu	Thr	Ser	Gln	Pro	Ser	Asp	155	160	165
Ser	Asn	Pro	Lys	Lys	Ser	Phe	Tyr	Thr	Leu	Met	Lys	Asn	Asn	Gly	170	175	180
Val	Phe	Val	Ala	Ser	Val	Ile	Ile	Asn	Gly	Cys	Tyr	Asp	Phe	Ser	185	190	195
Phe	Asn	Asn	Thr	Thr	Ile	Ser	Pro	Tyr	Val	Cys	Ile	Gly	Val	Gly	200	205	210
Gly	Asp	Phe	Ile	Glu	Phe	Phe	Glu	Val	Met	His	Ile	Lys	Phe	Ala	215	220	225
Cys	Gln	Ser	Lys	Val	Gly	Ile	Ser	Tyr	Pro	Ile	Ser	Pro	Ser	Ile	230	235	240
Thr	Ile	Phe	Ala	Asp	Ala	His	Tyr	His	Lys	Val	Ile	Asn	Asn	Lys	245	250	255
Phe	Asn	Asn	Leu	His	Val	Lys	Tyr	Ser	Tyr	Glu	Leu	Lys	Asn	Ser	260	265	270
Pro	Thr	Ile	Thr	Ser	Ala	Thr	Ala	Lys	Leu	Asn	Ile	Glu	Tyr	Phe	275	280	285
Gly	Gly	Glu	Val	Gly	Met	Arg	Phe	Ile	Phe						290	295	

<210> 6

<211> 279

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-6 Outer Membrane Protein of

Ehrlichia chaffeensis

<400> 6
Met Ser Lys Lys Lys Phe Ile Thr Ile Gly Thr Val Leu Ala Ser
5 10 15
Leu Leu Ser Phe Leu Ser Ile Glu Ser Phe Ser Ala Ile Asn His
20 25 30
Asn His Thr Gly Asn Asn Thr Ser Gly Ile Tyr Ile Thr Gly Gln
35 40 45
Tyr Arg Pro Gly Val Ser His Phe Ser Asn Phe Ser Val Lys Glu
50 55 60
Thr Asn Val Asp Thr Ile Gln Leu Val Gly Tyr Lys Lys Ser Ala
65 70 75
Ser Ser Ile Asp Pro Asn Thr Tyr Ser Asn Phe Gln Gly Pro Tyr
80 85 90
Thr Val Thr Phe Gln Asp Asn Ala Ala Ser Phe Ser Gly Ala Ile
95 100 105
Gly Tyr Ser Tyr Pro Glu Ser Leu Arg Leu Glu Leu Glu Gly Ser
110 115 120
Tyr Glu Lys Phe Asp Val Lys Asp Pro Lys Asp Tyr Ser Ala Lys
125 130 135
Asp Ala Phe Arg Phe Phe Ala Leu Ala Arg Asn Thr Ser Thr Thr
140 145 150
Val Pro Asp Ala Gln Lys Tyr Thr Val Met Lys Asn Asn Gly Leu
155 160 165
Ser Val Ala Ser Ile Met Ile Asn Gly Cys Tyr Asp Leu Ser Phe
170 175 180
Asn Asn Leu Val Val Ser Pro Tyr Ile Cys Ala Gly Ile Gly Glu
185 190 195
Asp Phe Ile Glu Phe Phe Asp Thr Leu His Ile Lys Leu Ala Tyr
200 205 210

Gln Gly Lys Leu Gly Ile Ser Tyr Tyr Phe Phe Pro Lys Ile Asn
215 220 225

Val Phe Ala Gly Gly Tyr Tyr His Arg Val Ile Gly Asn Lys Phe
230 235 240

Lys Asn Leu Asn Val Asn His Val Val Thr Pro Asp Glu Phe Pro
245 250 255

Lys Ala Thr Ser Ala Val Ala Thr Leu Asn Val Ala Tyr Phe Gly
260 265 270

Gly Glu Ala Gly Val Lys Phe Thr Phe
275

<210> 7
<211> 283
<212> PRT
<213> *Ehrlichia chaffeensis*

<220>
<223> P28-7 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 7

Met Ser Ala Lys Lys Lys Leu Phe Ile Ile Gly Ser Val Leu Val
5 10 15

Cys Leu Val Ser Tyr Leu Pro Thr Lys Ser Leu Ser Asn Leu Asn
20 25 30

Asn Ile Asn Asn Asn Thr Lys Cys Thr Gly Leu Tyr Val Ser Gly
35 40 45

Gln Tyr Lys Pro Thr Val Ser His Phe Ser Asn Phe Ser Leu Lys
50 55 60

Glu Thr Tyr Thr Asp Thr Lys Glu Leu Leu Gly Leu Ala Lys Asp
65 70 75

Ile	Lys	Ser	Ile	Thr	Asp	Ile	Thr	Thr	Asn	Lys	Lys	Phe	Asn	Ile	80	85	90
Pro	Tyr	Asn	Thr	Lys	Phe	Gln	Asp	Asn	Ala	Val	Ser	Phe	Ser	Ala	95	100	105
Ala	Val	Gly	Tyr	Ile	Ser	Gln	Asp	Ser	Pro	Arg	Val	Glu	Val	Glu	110	115	120
Trp	Ser	Tyr	Glu	Glu	Phe	Asp	Val	Lys	Asn	Pro	Gly	Asn	Tyr	Val	125	130	135
Val	Ser	Glu	Ala	Phe	Arg	Tyr	Ile	Ala	Leu	Ala	Arg	Gly	Ile	Asp	140	145	150
Asn	Leu	Gln	Lys	Tyr	Pro	Glu	Thr	Asn	Lys	Tyr	Val	Val	Ile	Lys	155	160	165
Asn	Asn	Gly	Leu	Ser	Val	Ala	Ser	Ile	Ile	Ile	Asn	Gly	Cys	Tyr	170	175	180
Asp	Phe	Ser	Leu	Asn	Asn	Leu	Lys	Val	Ser	Pro	Tyr	Ile	Cys	Val	185	190	195
Gly	Phe	Gly	Gly	Asp	Ile	Ile	Glu	Phe	Phe	Ser	Ala	Val	Ser	Phe	200	205	210
Lys	Phe	Ala	Tyr	Gln	Gly	Lys	Val	Gly	Ile	Ser	Tyr	Pro	Leu	Phe	215	220	225
Ser	Asn	Met	Ile	Ile	Phe	Ala	Asp	Gly	Tyr	Tyr	His	Lys	Val	Ile	230	235	240
Gly	Asn	Lys	Phe	Asn	Asn	Leu	Asn	Val	Gln	His	Val	Val	Ser	Leu	245	250	255
Asn	Ser	His	Pro	Lys	Ser	Thr	Phe	Ala	Val	Ala	Thr	Leu	Asn	Val	260	265	270
Glu	Tyr	Phe	Gly	Ser	Glu	Phe	Gly	Leu	Lys	Phe	Ile	Phe			275	280	

<210> 8
 <211> 275
 <212> PRT
 <213> *Ehrlichia chaffeensis*

<220>
 <223> P28-8 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 8
 Met Ser Lys Lys Asn Phe Ile Thr Ile Gly Ala Thr Leu Ile His
 5 10 15
 Met Leu Leu Pro Asn Ile Ser Phe Pro Glu Thr Ile Asn Asn Asn
 20 25 30
 Thr Asp Lys Leu Ser Gly Leu Tyr Ile Ser Gly Gln Tyr Lys Pro
 35 40 45
 Gly Ile Ser His Phe Ser Lys Phe Ser Val Lys Glu Ile Tyr Asn
 50 55 60
 Asp Asn Ile Gln Leu Ile Gly Leu Arg His Asn Ala Ile Ser Thr
 65 70 75
 Ser Thr Leu Asn Ile Asn Thr Asp Phe Asn Ile Pro Tyr Lys Val
 80 85 90
 Thr Phe Gln Asn Asn Ile Thr Ser Phe Ser Gly Ala Ile Gly Tyr
 95 100 105
 Ser Asp Pro Thr Gly Ala Arg Phe Glu Leu Glu Gly Ser Tyr Glu
 110 115 120
 Glu Phe Asp Val Thr Asp Pro Gly Asp Cys Leu Ile Lys Asp Thr
 125 130 135
 Tyr Arg Tyr Phe Ala Leu Ala Arg Asn Pro Ser Gly Ser Ser Pro
 140 145 150

Thr	Ser	Asn	Asn	Tyr	Thr	Val	Met	Arg	Asn	Asp	Gly	Val	Ser	Ile
				155					160					165
Thr	Ser	Val	Ile	Phe	Asn	Gly	Cys	Tyr	Asp	Ile	Phe	Leu	Lys	Asp
				170					175					180
Leu	Glu	Val	Ser	Pro	Tyr	Val	Cys	Val	Gly	Val	Gly	Gly	Asp	Phe
				185					190					195
Ile	Glu	Phe	Phe	Asp	Ala	Leu	His	Ile	Lys	Leu	Ala	Tyr	Gln	Gly
				200					205					210
Lys	Leu	Gly	Ile	Asn	Tyr	His	Leu	Ser	Thr	Gln	Ala	Ser	Val	Phe
				215					220					225
Ile	Asp	Gly	Tyr	Tyr	His	Lys	Val	Ile	Gly	Asn	Gln	Phe	Asn	Asn
				230					235					240
Leu	Asn	Val	Gln	His	Val	Ala	Ser	Thr	Asp	Phe	Gly	Pro	Val	Tyr
				245					250					255
Ala	Val	Ala	Thr	Leu	Asn	Ile	Gly	Tyr	Phe	Gly	Gly	Glu	Ile	Gly
				260					265					270
Ile	Arg	Leu	Thr	Phe										
				275										

<210> 9

<211> 285

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-9 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 9

Met	Asn	Asn	Arg	Lys	Ser	Phe	Phe	Ile	Ile	Gly	Ala	Ser	Leu	Leu
				5					10					15

Ala	Ser	Leu	Leu	Phe	Thr	Ser	Glu	Ala	Ser	Ser	Thr	Gly	Asn	Val
				20					25					30
Ser	Asn	His	Thr	Tyr	Phe	Lys	Pro	Arg	Leu	Tyr	Ile	Ser	Gly	Gln
				35					40					45
Tyr	Arg	Pro	Gly	Val	Ser	His	Phe	Ser	Lys	Phe	Ser	Val	Lys	Glu
				50					55					60
Thr	Asn	Tyr	Asn	Thr	Thr	Gln	Leu	Val	Gly	Leu	Lys	Lys	Asp	Ile
				65					70					75
Ser	Val	Ile	Gly	Asn	Ser	Asn	Ile	Thr	Thr	Tyr	Thr	Asn	Phe	Asn
				80					85					90
Phe	Pro	Tyr	Ile	Ala	Glu	Phe	Gln	Asp	Asn	Ala	Ile	Ser	Phe	Ser
				95					100					105
Gly	Ala	Ile	Gly	Tyr	Leu	Tyr	Ser	Glu	Asn	Phe	Arg	Ile	Glu	Val
				110					115					120
Glu	Ala	Ser	Tyr	Glu	Glu	Phe	Asp	Val	Lys	Asn	Pro	Glu	Gly	Ser
				125					130					135
Ala	Thr	Asp	Ala	Tyr	Arg	Tyr	Phe	Ala	Leu	Ala	Arg	Ala	Met	Asp
				140					145					150
Gly	Thr	Asn	Lys	Ser	Ser	Pro	Asp	Asp	Thr	Arg	Lys	Phe	Thr	Val
				155					160					165
Met	Arg	Asn	Asp	Gly	Leu	Ser	Ile	Ser	Ser	Val	Met	Ile	Asn	Gly
				170					175					180
Cys	Tyr	Asn	Phe	Thr	Leu	Asp	Asp	Ile	Pro	Val	Val	Pro	Tyr	Val
				185					190					195
Cys	Ala	Gly	Ile	Gly	Gly	Asp	Phe	Ile	Glu	Phe	Phe	Asn	Asp	Leu
				200					205					210
His	Val	Lys	Phe	Ala	His	Gln	Gly	Lys	Val	Gly	Ile	Ser	Tyr	Ser
				215					220					225
Ile	Ser	Pro	Glu	Val	Ser	Leu	Phe	Leu	Asn	Gly	Tyr	Tyr	His	Lys
				230					235					240

Val	Thr	Gly	Asn	Arg	Phe	Lys	Asn	Leu	His	Val	Gln	His	Val	Ser
				245					250					255

Asp	Leu	Ser	Asp	Ala	Pro	Lys	Phe	Thr	Ser	Ala	Val	Ala	Thr	Leu
				260					265					270

Asn	Val	Gly	Tyr	Phe	Gly	Gly	Glu	Ile	Gly	Val	Arg	Phe	Ile	Phe
				275					280					285

<210> 10

<211> 291

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-10 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 10

Met	Asn	Lys	Lys	Asn	Lys	Phe	Ile	Ile	Ala	Thr	Ala	Leu	Val	Tyr
				5					10					15

Leu	Leu	Ser	Leu	Pro	Ser	Val	Ser	Phe	Ser	Glu	Val	Thr	Asn	Ser
				20					25					30

Ser	Ile	Lys	Lys	His	Ser	Gly	Leu	Tyr	Ile	Ser	Gly	Gln	Tyr	Lys
				35					40					45

Pro	Ser	Val	Ser	Val	Phe	Ser	Ser	Phe	Ser	Ile	Lys	Glu	Thr	Asn
				50					55					60

Thr	Ile	Thr	Lys	Ile	Leu	Ile	Ala	Leu	Lys	Lys	Asp	Ile	Asn	Ser
				65					70					75

Leu	Glu	Val	Asn	Ala	Asp	Ala	Ser	Gln	Gly	Ile	Ser	His	Pro	Gly
				80					85					90

Asn	Phe	Thr	Ile	Pro	Tyr	Ile	Ala	Ala	Phe	Glu	Asp	Asn	Ala	Phe
				95					100					105

Asn	Phe	Asn	Gly	Ala	Ile	Gly	Tyr	Ile	Thr	Glu	Gly	Leu	Arg	Ile	110	115	120
Glu	Ile	Glu	Gly	Ser	Tyr	Glu	Glu	Phe	Asp	Ala	Lys	Asn	Pro	Gly	125	130	135
Gly	Tyr	Gly	Leu	Asn	Asp	Ala	Phe	Arg	Tyr	Phe	Ala	Leu	Ala	Arg	140	145	150
Asp	Met	Glu	Ser	Asn	Lys	Phe	Gln	Pro	Lys	Ala	Gln	Ser	Ser	Gln	155	160	165
Lys	Val	Phe	His	Thr	Val	Met	Lys	Ser	Asp	Gly	Leu	Ser	Ile	Ile	170	175	180
Ser	Ile	Met	Gly	Asn	Gly	Trp	Tyr	Asp	Phe	Ser	Ser	Asp	Asn	Leu	185	190	195
Leu	Val	Ser	Pro	Tyr	Ile	Cys	Gly	Gly	Ile	Gly	Val	Asp	Ala	Ile	200	205	210
Glu	Phe	Phe	Asp	Ala	Leu	His	Ile	Lys	Leu	Ala	Cys	Pro	Ser	Lys	215	220	225
Leu	Gly	Ile	Thr	Tyr	Gln	Leu	Ser	Tyr	Asn	Ile	Ser	Leu	Phe	Ala	230	235	240
Val	Gly	Phe	Tyr	His	Gln	Val	Ile	Gly	Asn	Gln	Phe	Arg	Asn	Leu	245	250	255
Asn	Val	Gln	His	Val	Ala	Glu	Leu	Asn	Asp	Ala	Pro	Lys	Val	Thr	260	265	270
Ser	Ala	Val	Ala	Thr	Leu	Asn	Val	Gly	Tyr	Phe	Gly	Ala	Glu	Val	275	280	285
Gly	Val	Arg	Phe	Ile	Phe										290		

<210> 11
 <211> 298
 <212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-11 Outer Membrane Protein of
 Ehrlichia chaffeensis

<400> 11

Met	Asn	His	Lys	Ser	Met	Leu	Phe	Thr	Ile	Gly	Thr	Ala	Leu	Ile	
				5					10					15	
Ser	Leu	Leu	Ser	Leu	Pro	Asn	Val	Ser	Phe	Ser	Gly	Ile	Ile	Asn	
				20					25					30	
Asn	Asn	Ala	Asn	Asn	Leu	Gly	Ile	Tyr	Ile	Ser	Gly	Gln	Tyr	Lys	
				35					40					45	
Pro	Ser	Val	Ser	Val	Phe	Ser	Asn	Phe	Ser	Val	Lys	Glu	Thr	Asn	
				50					55					60	
Phe	Thr	Thr	Gln	Gln	Leu	Val	Ala	Leu	Lys	Lys	Asp	Ile	Asp	Ser	
				65					70					75	
Val	Asp	Ile	Ser	Thr	Asn	Ala	Asp	Ser	Gly	Ile	Asn	Asn	Pro	Gln	
				80					85					90	
Asn	Phe	Thr	Ile	Pro	Tyr	Ile	Pro	Lys	Phe	Gln	Asp	Asn	Ala	Ala	
				95					100					105	
Ser	Phe	Ser	Gly	Ala	Leu	Gly	Phe	Phe	Tyr	Ala	Arg	Gly	Leu	Arg	
				110					115					120	
Leu	Glu	Met	Glu	Gly	Ser	Tyr	Glu	Glu	Phe	Asp	Val	Lys	Asn	Pro	
				125					130					135	
Gly	Gly	Tyr	Thr	Lys	Val	Lys	Asp	Ala	Tyr	Arg	Tyr	Phe	Ala	Leu	
				140					145					150	
Ala	Arg	Glu	Met	Gln	Ser	Gly	Gln	Thr	Cys	Pro	Lys	His	Lys	Glu	
				155					160					165	
Thr	Ser	Gly	Ile	Gln	Pro	His	Gly	Ile	Tyr	His	Thr	Val	Met	Arg	
				170					175					180	

Asn Asp Gly Val Ser Ile Ser Ser Val Ile Ile Asn Gly Cys Tyr
185 190 195

Asn Phe Thr Leu Ser Asn Leu Pro Ile Ser Pro Tyr Met Cys Val
200 205 210

Gly Met Gly Ile Asp Ala Ile Gln Phe Phe Asp Ser Leu His Ile
215 220 225

Lys Phe Ala His Gln Ser Lys Leu Gly Ile Thr Tyr Pro Leu Ser
230 235 240

Ser Asn Val His Leu Phe Ala Asp Ser Tyr Tyr His Lys Val Ile
245 250 255

Gly Asn Lys Phe Lys Asn Leu Arg Val Gln His Val Tyr Glu Leu
260 265 270

Gln Gln Val Pro Lys Val Thr Ser Ala Val Ala Thr Leu Asp Ile
275 280 285

Gly Tyr Phe Gly Gly Glu Val Gly Val Arg Phe Ile Leu
290 295

<210> 12

<211> 300

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-12 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 12

Met Lys Lys Lys Asn Gln Phe Ile Thr Ile Ser Thr Ile Leu Val
5 10 15

Cys Leu Leu Ser Leu Ser Asn Ala Ser Leu Ser Asn Thr Thr Asn
20 25 30

Ser	Ser	Thr	Lys	Lys	Gln	Phe	Gly	Leu	Tyr	Val	Ser	Gly	Gln	Tyr	35	40	45
Lys	Pro	Ser	Val	Ser	Ile	Phe	Ser	Asn	Phe	Ser	Val	Lys	Glu	Thr	50	55	60
Asn	Phe	Pro	Thr	Lys	Tyr	Leu	Ala	Ala	Leu	Lys	Lys	Asp	Ile	Asn	65	70	75
Ser	Val	Glu	Phe	Asp	Asp	Ser	Val	Thr	Ala	Gly	Ile	Ser	Tyr	Pro	80	85	90
Leu	Asn	Phe	Ser	Thr	Pro	Tyr	Ile	Ala	Val	Phe	Gln	Asp	Asn	Ile	95	100	105
Ser	Asn	Phe	Asn	Gly	Ala	Ile	Gly	Tyr	Thr	Phe	Val	Glu	Gly	Pro	110	115	120
Arg	Ile	Glu	Ile	Glu	Gly	Ser	Tyr	Glu	Glu	Phe	Asp	Val	Lys	Asp	125	130	135
Pro	Gly	Arg	Tyr	Thr	Glu	Ile	Gln	Asp	Ala	Tyr	Arg	Tyr	Phe	Ala	140	145	150
Leu	Ala	Arg	Asp	Ile	Asp	Ser	Ile	Pro	Thr	Ser	Pro	Lys	Asn	Arg	155	160	165
Thr	Ser	His	Asp	Gly	Asn	Ser	Ser	Tyr	Lys	Val	Tyr	His	Thr	Val	170	175	180
Met	Lys	Asn	Glu	Gly	Leu	Ser	Ile	Ile	Ser	Ile	Met	Val	Asn	Gly	185	190	195
Cys	Tyr	Asp	Phe	Ser	Ser	Asp	Asn	Leu	Ser	Ile	Leu	Pro	Tyr	Val	200	205	210
Cys	Gly	Gly	Ile	Gly	Val	Asn	Ala	Ile	Glu	Phe	Phe	Asp	Ala	Leu	215	220	225
His	Val	Lys	Phe	Ala	Cys	Gln	Gly	Lys	Leu	Gly	Ile	Thr	Tyr	Pro	230	235	240
Leu	Ser	Ser	Asn	Val	Ser	Leu	Phe	Ala	Gly	Gly	Tyr	Tyr	His	Gln	245	250	255

Val	Met	Gly	Asn	Gln	Phe	Lys	Asn	Leu	Asn	Val	Gln	His	Val	Ala
				260					265					270

Glu	Leu	Asn	Asp	Ala	Pro	Lys	Val	Thr	Ser	Ala	Val	Ala	Thr	Leu
				275					280					285

Asp	Ile	Gly	Tyr	Phe	Gly	Gly	Glu	Ile	Gly	Ala	Arg	Leu	Ile	Phe
				290					295					300

<210> 13

<211> 293

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-13 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 13

Met	Asn	Lys	Lys	Asn	Lys	Phe	Phe	Thr	Ile	Ser	Thr	Ala	Met	Val
				5					10					15

Cys	Leu	Leu	Leu	Leu	Pro	Gly	Ile	Ser	Phe	Ser	Glu	Thr	Ile	Asn
				20					25					30

Asn	Ser	Ala	Lys	Lys	Gln	Pro	Gly	Leu	Tyr	Ile	Ser	Gly	Gln	Tyr
				35					40					45

Lys	Pro	Ser	Val	Ser	Val	Phe	Ser	Asn	Phe	Ser	Val	Lys	Glu	Thr
				50					55					60

Asn	Val	Pro	Thr	Lys	Gln	Leu	Ile	Ala	Leu	Lys	Lys	Asp	Ile	Asn
				65					70					75

Ser	Val	Ala	Val	Gly	Ser	Asn	Ala	Thr	Thr	Gly	Ile	Ser	Asn	Pro
				80					85					90

Gly	Asn	Phe	Thr	Ile	Pro	Tyr	Thr	Ala	Glu	Phe	Gln	Asp	Asn	Val
				95					100					105
Ala	Asn	Phe	Asn	Gly	Ala	Val	Gly	Tyr	Ser	Phe	Pro	Asp	Ser	Leu
				110					115					120
Arg	Ile	Glu	Ile	Glu	Gly	Phe	His	Glu	Lys	Phe	Asp	Val	Lys	Asn
				125					130					135
Pro	Gly	Gly	Tyr	Thr	Gln	Val	Lys	Asp	Ala	Tyr	Arg	Tyr	Phe	Ala
				140					145					150
Leu	Ala	Arg	Asp	Leu	Lys	Asp	Gly	Phe	Phe	Glu	Pro	Lys	Ala	Glu
				155					160					165
Asp	Thr	Gly	Val	Tyr	His	Thr	Val	Met	Lys	Asn	Asp	Gly	Leu	Ser
				170					175					180
Ile	Leu	Ser	Thr	Met	Val	Asn	Val	Cys	Tyr	Asp	Phe	Ser	Val	Asp
				185					190					195
Glu	Leu	Pro	Val	Leu	Pro	Tyr	Ile	Cys	Ala	Gly	Met	Gly	Ile	Asn
				200					205					210
Ala	Ile	Glu	Phe	Phe	Asp	Ala	Leu	His	Val	Lys	Phe	Ala	Tyr	Gln
				215					220					225
Gly	Lys	Leu	Gly	Ile	Ser	Tyr	Gln	Leu	Phe	Thr	Lys	Val	Asn	Leu
				230					235					240
Phe	Leu	Asp	Gly	Tyr	Tyr	His	Gln	Val	Ile	Gly	Asn	Gln	Phe	Lys
				245					250					255
Asn	Leu	Asn	Val	Asn	His	Val	Tyr	Thr	Leu	Lys	Glu	Ser	Pro	Lys
				260					265					270
Val	Thr	Ser	Ala	Val	Ala	Thr	Leu	Asp	Ile	Ala	Tyr	Phe	Gly	Gly
				275					280					285
Glu	Val	Gly	Ile	Arg	Phe	Thr	Phe							
				290										

<210> 14
 <211> 283
 <212> PRT
 <213> *Ehrlichia chaffeensis*

<220>
 <223> P28-14 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 14
 Met Asn Tyr Lys Lys Ile Phe Val Ser Ser Ala Leu Ile Ser Leu
 5 10 15
 Met Ser Ile Leu Pro Tyr Gln Ser Phe Ala Asp Pro Val Thr Ser
 20 25 30
 Asn Asp Thr Gly Ile Asn Asp Ser Arg Glu Gly Phe Tyr Ile Ser
 35 40 45
 Val Lys Tyr Asn Pro Ser Ile Ser His Phe Arg Lys Phe Ser Ala
 50 55 60
 Glu Glu Ala Pro Ile Asn Gly Asn Thr Ser Ile Thr Lys Lys Val
 65 70 75
 Phe Gly Leu Lys Lys Asp Gly Asp Ile Ala Gln Ser Ala Asn Phe
 80 85 90
 Asn Arg Thr Asp Pro Ala Leu Glu Phe Gln Asn Asn Leu Ile Ser
 95 100 105
 Gly Phe Ser Gly Ser Ile Gly Tyr Ala Met Asp Gly Pro Arg Ile
 110 115 120
 Glu Leu Glu Ala Ala Tyr Gln Lys Phe Asp Ala Lys Asn Pro Asp
 125 130 135
 Asn Asn Asp Thr Asn Ser Gly Asp Tyr Tyr Lys Tyr Phe Gly Leu
 140 145 150

Ser	Arg	Glu	Asp	Ala	Ile	Ala	Asp	Lys	Lys	Tyr	Val	Val	Leu	Lys
				155					160					165
Asn	Glu	Gly	Ile	Thr	Phe	Met	Ser	Leu	Met	Val	Asn	Thr	Cys	Tyr
				170					175					180
Asp	Ile	Thr	Ala	Glu	Gly	Val	Pro	Phe	Ile	Pro	Tyr	Ala	Cys	Ala
				185					190					195
Gly	Val	Gly	Ala	Asp	Leu	Ile	Asn	Val	Phe	Lys	Asp	Phe	Asn	Leu
				200					205					210
Lys	Phe	Ser	Tyr	Gln	Gly	Lys	Ile	Gly	Ile	Ser	Tyr	Pro	Ile	Thr
				215					220					225
Pro	Glu	Val	Ser	Ala	Phe	Ile	Gly	Gly	Tyr	Tyr	His	Gly	Val	Ile
				230					235					240
Gly	Asn	Asn	Phe	Asn	Lys	Ile	Pro	Val	Ile	Thr	Pro	Val	Val	Leu
				245					250					255
Glu	Gly	Ala	Pro	Gln	Thr	Thr	Ser	Ala	Leu	Val	Thr	Ile	Asp	Thr
				260					265					270
Gly	Tyr	Phe	Gly	Gly	Glu	Val	Gly	Val	Arg	Phe	Thr	Phe		
				275					280					

<210> 15
 <211> 280
 <212> PRT
 <213> *Ehrlichia chaffeensis*

<220>
 <223> P28-15 Outer Membrane Protein of
Ehrlichia chaffeensis

<400>				15										
Met	Asn	Cys	Lys	Lys	Phe	Phe	Ile	Thr	Thr	Ala	Leu	Ala	Leu	Pro
				5					10					15

Met	Ser	Phe	Leu	Pro	Gly	Ile	Leu	Leu	Ser	Glu	Pro	Val	Gln	Asp	
				20					25					30	
Asp	Ser	Val	Ser	Gly	Asn	Phe	Tyr	Ile	Ser	Gly	Lys	Tyr	Met	Pro	
				35					40					45	
Ser	Ala	Ser	His	Phe	Gly	Val	Phe	Ser	Ala	Lys	Glu	Glu	Lys	Asn	
				50					55					60	
Pro	Thr	Val	Ala	Leu	Tyr	Gly	Leu	Lys	Gln	Asp	Trp	Asn	Gly	Val	
				65					70					75	
Ser	Ala	Ser	Ser	His	Ala	Asp	Ala	Asp	Phe	Asn	Asn	Lys	Gly	Tyr	
				80					85					90	
Ser	Phe	Lys	Tyr	Glu	Asn	Asn	Pro	Phe	Leu	Gly	Phe	Ala	Gly	Ala	
				95					100					105	
Ile	Gly	Tyr	Ser	Met	Gly	Gly	Pro	Arg	Ile	Glu	Phe	Glu	Val	Ser	
				110					115					120	
Tyr	Glu	Thr	Phe	Asp	Val	Lys	Asn	Gln	Gly	Gly	Asn	Tyr	Lys	Asn	
				125					130					135	
Asp	Ala	His	Arg	Tyr	Cys	Ala	Leu	Asp	Arg	Lys	Ala	Ser	Ser	Thr	
				140					145					150	
Asn	Ala	Thr	Ala	Ser	His	Tyr	Val	Leu	Leu	Lys	Asn	Glu	Gly	Leu	
				155					160					165	
Leu	Asp	Ile	Ser	Leu	Met	Leu	Asn	Ala	Cys	Tyr	Asp	Val	Val	Ser	
				170					175					180	
Glu	Gly	Ile	Pro	Phe	Ser	Pro	Tyr	Ile	Cys	Ala	Gly	Val	Gly	Thr	
				185					190					195	
Asp	Leu	Ile	Ser	Met	Phe	Glu	Ala	Ile	Asn	Pro	Lys	Ile	Ser	Tyr	
				200					205					210	
Gln	Gly	Lys	Leu	Gly	Leu	Ser	Tyr	Ser	Ile	Asn	Pro	Glu	Ala	Ser	
				215					220					225	
Val	Phe	Val	Gly	Gly	His	Phe	His	Lys	Val	Ala	Gly	Asn	Glu	Phe	
				230					235					240	

Arg Asp Ile Ser Thr Leu Lys Ala Phe Ala Thr Pro Ser Ser Ala
245 250 255

Ala Thr Pro Asp Leu Ala Thr Val Thr Leu Ser Val Cys His Phe
260 265 270

Gly Val Glu Leu Gly Gly Arg Phe Asn Phe
275 280

<210> 16

<211> 286

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-16 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 16

Met Asn Cys Glu Lys Phe Phe Ile Thr Thr Ala Leu Thr Leu Leu
5 10 15

Met Ser Phe Leu Pro Gly Ile Ser Leu Ser Asp Pro Val Gln Asp
20 25 30

Asp Asn Ile Ser Gly Asn Phe Tyr Ile Ser Gly Lys Tyr Met Pro
35 40 45

Ser Ala Ser His Phe Gly Val Phe Ser Ala Lys Glu Glu Arg Asn
50 55 60

Thr Thr Val Gly Val Phe Gly Ile Glu Gln Asp Trp Asp Arg Cys
65 70 75

Val Ile Ser Arg Thr Thr Leu Ser Asp Ile Phe Thr Val Pro Asn
80 85 90

Tyr Ser Phe Lys Tyr Glu Asn Asn Leu Phe Ser Gly Phe Ala Gly
95 100 105

Ala	Ile	Gly	Tyr	Ser	Met	Asp	Gly	Pro	Arg	Ile	Glu	Leu	Glu	Val	110	115	120
Ser	Tyr	Glu	Ala	Phe	Asp	Val	Lys	Asn	Gln	Gly	Asn	Asn	Tyr	Lys	125	130	135
Asn	Glu	Ala	His	Arg	Tyr	Tyr	Ala	Leu	Ser	His	Leu	Leu	Gly	Thr	140	145	150
Glu	Thr	Gln	Ile	Asp	Gly	Ala	Gly	Ser	Ala	Ser	Val	Phe	Leu	Ile	155	160	165
Asn	Glu	Gly	Leu	Leu	Asp	Lys	Ser	Phe	Met	Leu	Asn	Ala	Cys	Tyr	170	175	180
Asp	Val	Ile	Ser	Glu	Gly	Ile	Pro	Phe	Ser	Pro	Tyr	Ile	Cys	Ala	185	190	195
Gly	Ile	Gly	Ile	Asp	Leu	Val	Ser	Met	Phe	Glu	Ala	Ile	Asn	Pro	200	205	210
Lys	Ile	Ser	Tyr	Gln	Gly	Lys	Leu	Gly	Leu	Ser	Tyr	Pro	Ile	Ser	215	220	225
Pro	Glu	Ala	Ser	Val	Phe	Ile	Gly	Gly	His	Phe	His	Lys	Val	Ile	230	235	240
Gly	Asn	Glu	Phe	Arg	Asp	Ile	Pro	Thr	Met	Ile	Pro	Ser	Glu	Ser	245	250	255
Ala	Leu	Ala	Gly	Lys	Gly	Asn	Tyr	Pro	Ala	Ile	Val	Thr	Leu	Asp	260	265	270
Val	Phe	Tyr	Phe	Gly	Ile	Glu	Leu	Gly	Gly	Arg	Phe	Asn	Phe	Gln	275	280	285

Leu

<210> 17

<211> 278

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-17 Outer Membrane Protein of
 Ehrlichia chaffeensis

<400> 17

Met	Asn	Cys	Lys	Lys	Phe	Phe	Ile	Thr	Thr	Ala	Leu	Val	Ser	Leu	
				5					10					15	
Met	Ser	Phe	Leu	Pro	Gly	Ile	Ser	Phe	Ser	Asp	Pro	Val	Gln	Gly	
				20					25					30	
Asp	Asn	Ile	Ser	Gly	Asn	Phe	Tyr	Val	Ser	Gly	Lys	Tyr	Met	Pro	
				35					40					45	
Ser	Ala	Ser	His	Phe	Gly	Met	Phe	Ser	Ala	Lys	Glu	Glu	Lys	Asn	
				50					55					60	
Pro	Thr	Val	Ala	Leu	Tyr	Gly	Leu	Lys	Gln	Asp	Trp	Glu	Gly	Ile	
				65					70					75	
Ser	Ser	Ser	Ser	His	Asn	Asp	Asn	His	Phe	Asn	Asn	Lys	Gly	Tyr	
				80					85					90	
Ser	Phe	Lys	Tyr	Glu	Asn	Asn	Pro	Phe	Leu	Gly	Phe	Ala	Gly	Ala	
				95					100					105	
Ile	Gly	Tyr	Ser	Met	Gly	Gly	Pro	Arg	Val	Glu	Phe	Glu	Val	Ser	
				110					115					120	
Tyr	Glu	Thr	Phe	Asp	Val	Lys	Asn	Gln	Gly	Asn	Asn	Tyr	Lys	Asn	
				125					130					135	
Asp	Ala	His	Arg	Tyr	Cys	Ala	Leu	Gly	Gln	Gln	Asp	Asn	Ser	Gly	
				140					145					150	
Ile	Pro	Lys	Thr	Ser	Lys	Tyr	Val	Leu	Leu	Lys	Ser	Glu	Gly	Leu	
				155					160					165	
Leu	Asp	Ile	Ser	Phe	Met	Leu	Asn	Ala	Cys	Tyr	Asp	Ile	Ile	Asn	
				170					175					180	

Glu Ser Ile Pro Leu Ser Pro Tyr Ile Cys Ala Gly Val Gly Thr
185 190 195

Asp Leu Ile Ser Met Phe Glu Ala Thr Asn Pro Lys Ile Ser Tyr
200 205 210

Gln Gly Lys Leu Gly Leu Ser Tyr Ser Ile Asn Pro Glu Ala Ser
215 220 225

Val Phe Ile Gly Gly His Phe His Lys Val Ile Gly Asn Glu Phe
230 235 240

Arg Asp Ile Pro Thr Leu Lys Ala Phe Val Thr Ser Ser Ala Thr
245 250 255

Pro Asp Leu Ala Ile Val Thr Leu Ser Val Cys His Phe Gly Ile
260 265 270

Glu Leu Gly Gly Arg Phe Asn Phe
275

<210> 18

<211> 280

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-18 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 18

Met Asn Cys Lys Lys Phe Phe Ile Thr Thr Thr Leu Val Ser Leu
5 10 15

Met Ser Phe Leu Pro Gly Ile Ser Phe Ser Asp Ala Val Gln Asn
20 25 30

Asp Asn Val Gly Gly Asn Phe Tyr Ile Ser Gly Lys Tyr Val Pro
35 40 45

Ser	Val	Ser	His	Phe	Gly	Val	Phe	Ser	Ala	Lys	Gln	Glu	Arg	Asn	
				50					55					60	
Thr	Thr	Ile	Gly	Val	Phe	Gly	Leu	Lys	Gln	Asp	Trp	Asp	Gly	Ser	
				65					70					75	
Thr	Ile	Ser	Lys	Asn	Ser	Pro	Glu	Asn	Thr	Phe	Asn	Val	Pro	Asn	
				80					85					90	
Tyr	Ser	Phe	Lys	Tyr	Glu	Asn	Asn	Pro	Phe	Leu	Gly	Phe	Ala	Gly	
				95					100					105	
Ala	Val	Gly	Tyr	Leu	Met	Asn	Gly	Pro	Arg	Ile	Glu	Leu	Glu	Met	
				110					115					120	
Ser	Tyr	Glu	Thr	Phe	Asp	Val	Lys	Asn	Gln	Gly	Asn	Asn	Tyr	Lys	
				125					130					135	
Asn	Asp	Ala	His	Lys	Tyr	Tyr	Ala	Leu	Thr	His	Asn	Ser	Gly	Gly	
				140					145					150	
Lys	Leu	Ser	Asn	Ala	Gly	Asp	Lys	Phe	Val	Phe	Leu	Lys	Asn	Glu	
				155					160					165	
Gly	Leu	Leu	Asp	Ile	Ser	Leu	Met	Leu	Asn	Ala	Cys	Tyr	Asp	Val	
				170					175					180	
Ile	Ser	Glu	Gly	Ile	Pro	Phe	Ser	Pro	Tyr	Ile	Cys	Ala	Gly	Val	
				185					190					195	
Gly	Thr	Asp	Leu	Ile	Ser	Met	Phe	Glu	Ala	Ile	Asn	Pro	Lys	Ile	
				200					205					210	
Ser	Tyr	Gln	Gly	Lys	Leu	Gly	Leu	Ser	Tyr	Ser	Ile	Ser	Pro	Glu	
				215					220					225	
Ala	Ser	Val	Phe	Val	Gly	Gly	His	Phe	His	Lys	Val	Ile	Gly	Asn	
				230					235					240	
Glu	Phe	Arg	Asp	Ile	Pro	Ala	Met	Ile	Pro	Ser	Thr	Ser	Thr	Leu	
				245					250					255	
Thr	Gly	Asn	His	Phe	Thr	Ile	Val	Thr	Leu	Ser	Val	Cys	His	Phe	
				260					265					270	

Gly Val Glu Leu Gly Gly Arg Phe Asn Phe
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<211> 281

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-19 Outer Membrane Protein of
Ehrlichia chaffeensis

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Met	Asn	Tyr	Lys	Lys	Val	Phe	Ile	Thr	Ser	Ala	Leu	Ile	Ser	Leu	5	10	15
Ile	Ser	Ser	Leu	Pro	Gly	Val	Ser	Phe	Ser	Asp	Pro	Ala	Gly	Ser	20	25	30
Gly	Ile	Asn	Gly	Asn	Phe	Tyr	Ile	Ser	Gly	Lys	Tyr	Met	Pro	Ser	35	40	45
Ala	Ser	His	Phe	Gly	Val	Phe	Ser	Ala	Lys	Glu	Glu	Arg	Asn	Thr	50	55	60
Thr	Val	Gly	Val	Phe	Gly	Leu	Lys	Gln	Asn	Trp	Asp	Gly	Ser	Ala	65	70	75
Ile	Ser	Asn	Ser	Ser	Pro	Asn	Asp	Val	Phe	Thr	Val	Ser	Asn	Tyr	80	85	90
Ser	Phe	Lys	Tyr	Glu	Asn	Asn	Pro	Phe	Leu	Gly	Phe	Ala	Gly	Ala	95	100	105
Ile	Gly	Tyr	Ser	Met	Asp	Gly	Pro	Arg	Ile	Glu	Leu	Glu	Val	Ser	110	115	120

Tyr	Glu	Thr	Phe	Asp	Val	Lys	Asn	Gln	Gly	Asn	Asn	Tyr	Lys	Asn		
				125					130					135		
Glu	Ala	His	Arg	Tyr	Cys	Ala	Leu	Ser	His	Asn	Ser	Ala	Ala	Asp		
				140					145					150		
Met	Ser	Ser	Ala	Ser	Asn	Asn	Phe	Val	Phe	Leu	Lys	Asn	Glu	Gly		
				155					160					165		
Leu	Leu	Asp	Ile	Ser	Phe	Met	Leu	Asn	Ala	Cys	Tyr	Asp	Val	Val		
				170					175					180		
Gly	Glu	Gly	Ile	Pro	Phe	Ser	Pro	Tyr	Ile	Cys	Ala	Gly	Ile	Gly		
				185					190					195		
Thr	Asp	Leu	Val	Ser	Met	Phe	Glu	Ala	Thr	Asn	Pro	Lys	Ile	Ser		
				200					205					210		
Tyr	Gln	Gly	Lys	Leu	Gly	Leu	Ser	Tyr	Ser	Ile	Ser	Pro	Glu	Ala		
				215					220					225		
Ser	Val	Phe	Ile	Gly	Gly	His	Phe	His	Lys	Val	Ile	Gly	Asn	Glu		
				230					235					240		
Phe	Arg	Asp	Ile	Pro	Thr	Ile	Ile	Pro	Thr	Gly	Ser	Thr	Leu	Ala		
				245					250					255		
Gly	Lys	Gly	Asn	Tyr	Pro	Ala	Ile	Val	Ile	Leu	Asp	Val	Cys	His		
				260					265					270		
Phe	Gly	Ile	Glu	Leu	Gly	Gly	Arg	Phe	Ala	Phe						
				275					280							

<210> 20

<211> 271

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-20 Outer Membrane Protein of
Ehrlichia chaffeensis


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Leu Ser Phe Leu Pro Asp Asn Ser Phe Ser Asp Ala Asn Val Pro
                    20                      25                      30

Glu Gly Arg Lys Gly Phe Tyr Val Gly Thr Gln Tyr Lys Val Gly
                    35                      40                      45

Val Pro Asn Phe Ser Asn Phe Ser Ala Glu Glu Thr Leu Pro Gly
                    50                      55                      60

Leu Thr Lys Ser Ile Phe Ala Leu Gly Leu Asp Lys Ser Ser Ile
                    65                      70                      75

Ser Asp His Ala Gly Phe Thr Gln Ala Tyr Asn Pro Thr Tyr Ala
                    80                      85                      90

Ser Asn Phe Ala Gly Phe Gly Gly Val Ile Gly Tyr Tyr Val Asn
                    95                      100                     105

Asp Phe Arg Val Glu Phe Glu Gly Ala Tyr Glu Asn Phe Glu Pro
                    110                     115                     120

Glu Arg Gln Trp Tyr Pro Glu Gly Gly Glu Ser His Lys Phe Phe
                    125                     130                     135

Ala Leu Ser Arg Glu Ser Thr Val Gln Asp Asn Lys Phe Ile Val
                    140                     145                     150

Leu Glu Asn Asp Gly Val Ile Asp Lys Ser Leu Asn Val Asn Phe
                    155                     160                     165

Cys Tyr Asp Ile Ala His Gly Ser Ile Pro Leu Ala Pro Tyr Met
                    170                     175                     180

Cys Ala Gly Val Gly Ala Asp Tyr Ile Lys Phe Leu Gly Ile Ser
                    185                     190                     195

Leu Pro Lys Phe Ser Tyr Gln Val Lys Phe Gly Val Asn Tyr Pro
                    200                     205                     210

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Val	Ser	Val	Asn	Val	Met	Leu	Phe	Gly	Gly	Gly	Tyr	Tyr	His	Lys
			215						220					225

Val	Ile	Gly	Asn	Arg	Tyr	Glu	Arg	Val	Glu	Ile	Ala	Tyr	His	Pro
			230						235					240

Ala	Thr	Leu	Thr	Asn	Val	Pro	Lys	Thr	Thr	Ser	Ala	Ser	Ala	Thr
			245						250					255

Leu	Asp	Thr	Asp	Tyr	Phe	Gly	Trp	Glu	Val	Gly	Met	Arg	Phe	Thr
			260						265					270

Leu

<210> 21

<211> 279

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-21 Outer Membrane Protein of
Ehrlichia chaffeensis

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Met	Arg	Tyr	Lys	Asp	Phe	Ser	Asn	Asn	Ile	Asp	Val	Ile	Ile	Gly
			5						10					15

Thr	Leu	Val	Gly	Cys	Phe	Ser	Gly	Ser	Leu	Asp	Val	Ser	Asp	Ser
			20						25					30

Leu	Asn	Ser	Arg	Leu	Lys	Pro	Val	Phe	Leu	Gly	Ile	Ser	Tyr	Lys
			35						40					45

Leu	Ser	Ala	Pro	Leu	Phe	Ser	Ser	Phe	Ser	Ile	Gly	Glu	Thr	Tyr
			50						55					60

Arg	Ile	Asn	Gly	Val	Lys	Thr	Asp	Arg	Val	Val	Gly	Leu	Lys	Ser
			65						70					75

Asp	Ile	Leu	Leu	Asp 80	Ala	Asp	Lys	Ala	Met 85	Lys	Asp	Phe	Asn	Asn 90
Phe	Asn	Phe	Ser	Glu 95	Glu	Tyr	Val	Pro	Lys 100	Tyr	Asp	Asn	Asn	Ile 105
Phe	Gly	Leu	Ser	Phe 110	Ile	Phe	Gly	Tyr	Ser 115	Phe	Arg	Asn	Leu	Arg 120
Val	Glu	Leu	Glu	Gly 125	Ser	Tyr	Lys	Lys	Phe 130	Asp	Val	Ile	Asp	Thr 135
Arg	Asn	His	Leu	Val 140	Asp	Asn	Asn	Tyr	Arg 145	His	Ile	Ala	Leu	Val 150
Arg	Ser	Asn	Pro	Pro 155	Thr	Leu	Tyr	Asp	Tyr 160	Phe	Val	Leu	Lys	Asn 165
Asp	Gly	Val	Glu	Phe 170	Tyr	Ser	Thr	Ile	Leu 175	Asn	Ile	Cys	Tyr	Asp 180
Phe	Ala	Val	Asp	Thr 185	Asn	Ile	Val	Pro	Phe 190	Ser	Cys	Val	Gly	Ile 195
Gly	Glu	Asp	Ile	Ile 200	Lys	Ile	Phe	Asp	Ser 205	Ile	Arg	Phe	Lys	Pro 210
Ser	Phe	Asn	Ser	Lys 215	Leu	Gly	Ile	Asn	Tyr 220	Leu	Met	Ser	Gln	Asp 225
Met	Leu	Leu	Phe	Phe 230	Asp	Val	Tyr	Tyr	His 235	Arg	Val	Val	Gly	Asn 240
Glu	Tyr	Asn	Asn	Ile 245	Pro	Val	Gln	Tyr	Val 250	Ser	Leu	Pro	Asn	Pro 255
Leu	Asn	Ile	Ser	Thr 260	Ala	Ala	Lys	Leu	Asp 265	Met	Glu	Tyr	Phe	Gly 270
Ala	Glu	Ile	Gly	Ile 275	Lys	Val	Phe	Val						

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 <223> P28-10 reverse primer
 <400> 23
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<210> 24
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 <223> P28-11 forward primer
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 <223> P28-13 reverse primer
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